



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

U.G. DEGREE EXAMINATION – ALLIED

FOURTH SEMESTER – APRIL 2023

UMT 4401 – MATHEMATICS FOR COMMERCE

Date: 04-05-2023

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

SECTION A

Answer ALL the questions:

(10 x 2 = 20)

1. Define the nominal rate of interest.
2. Explain Simple interest.
3. Define the conjunction.
4. Differentiate converse statement from contrapositive statement.
5. The total cost function of a firm is given by $C = 0.04x^3 - 0.9x^2 + 10x^1 + 10$. Find the Average cost.
6. Integrate $\int 5x^2 dx$
7. State any two properties of definite integral.
8. Examine the equilibrium price by the method of excess demand given the functions:
$$Q_d = 50 - \frac{8p}{7}; Q_s = 10 + \frac{2p}{3}$$
9. Define Boolean algebra.
10. State Idempotent Law.

SECTION B

Answer any FIVE questions:

(5 x 8 = 40)

11. Mr X deposited Rs.10, 000 in a bank for 3 years offering interest at the rate of 6% compounded half-yearly during first year, at the rate of 12% compounded quarterly during second year and at 10% compounded continuously during 3rd year. Calculate his balance after 3 years.
12. The marginal cost function of a product is given by $\frac{dC}{dq} = 100 - 10q + 0.1q^2$, where q is the output. Obtain the total and the average cost function of the firm under the assumption that its fixed cost is Rs.500.
13. Show that P is equivalent to $\sim(\sim P)$, $(P \wedge P)$, $(P \vee P)$, $P \wedge (P \vee Q)$, $(P \wedge Q) \vee (P \wedge \sim Q)$ using truth table.
14. Illustrate briefly about Quantifiers with example.
15. Integrate $\frac{x}{(x-1)(2x+1)}$ with respect x .
16. Find the consumer surplus and producer surplus under pure competition for demand function $p = \frac{8}{x+1} - 2$ and supply function $= \frac{1}{2(x+3)}$, where p is the price and x is the quantity.
17. Explain briefly about conditional statement with examples.
18. Calculate $I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x + \sqrt{\cos x}}} dx$.

SECTION C

Answer any TWO questions:

(2 x 20 = 40)

19. (a) Find for each of the following the amount to which Rs.100 will accumulate.
 - (i) At the rate of interest 12% per annum compounded quarterly for 10 years.
 - (ii) At the force of interest 3% per annum for 3.5 years.

(iii) At the effective rate of interest 3% per annum for 10 years, 4% per annum for 4 years and 5% per annum for 2 years.

(iv) At the rate of interest corresponding to 3% per annum effective rate of discount for 8 years.

(b) Decide which of the following statements are true and which are false. Briefly validate your answer.

(i) If $1 = 1$, then most horses have 4 legs.

(ii) If $0 = 1$, then $1 = 1$.

(iii) If 8 is an even number, then the 7624th digit of π is a prime number.

(iv) If 7624th digit of π is a prime number, then $2 + 2 = 4$. (10+10)

20. (a) Design and compose associative property with respect to '+' and '.'

(b) Reframe the following expression in canonical form as intersection of unions and not as the union of intersections. $(x \cup y) \cap (y \cap z) \cap (x' \cup z) \cap (x' \cup y')$. (10+10)

21. (a) A sum of Rs.1000 is invested for 5 years at 12% interest per year. What is the simple interest? If the same amount had been invested for the same period at 10% per annum compound interest Compounded per year, how much more interest would be get?

(b) Let the cost function of a firm be given by the following equation: $C = 300x - 10x^2 + \frac{1}{3}x^3$, where C stands for cost and x for output. Estimate

(i) the output at which marginal cost is minimum.

(ii) the output at which average cost is minimum.

(iii) the output at which average cost is equal to marginal cost. (10+10)

22. (a) Integrate $\int \frac{(3x+7)}{2x^2+3x-2} dx$.

(b) The marginal cost of production of a firm is given as $C'(q) = 5 + 0.13q$. Further, the marginal revenue is $R'(q) = 18$ Also, it is given that $C(0) = \text{Rs.}120$. Determine the total profits.

(10+10)

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